

General Certificate of Secondary Education

GCSE AQA Mathematics (Grade 9-1) Higher Tier

Centre name				
Centre number				
Candidate number				

Practice Set 2 Paper 2: Calculator

Time allowed: 1 hour 30 minutes

Surname
Other names
Candidate signature

In addition to this paper you should have:

- A pen, pencil and eraser.
- A ruler.
- A protractor.
- A pair of compasses.
- A calculator.



Instructions to candidates

- Write your name and other details in the spaces provided above.
- Answer all questions in the spaces provided.
- In calculations show clearly how you worked out your answers.
- Calculators may be used — if your calculator doesn't have a π button, take the value of π to be 3.142

Information for candidates

- There are 80 marks available for this paper.
- The marks available are given in brackets at the end of each question.
- You may get marks for method, even if your answer is incorrect.

Advice to candidates

- Work steadily through the paper.
- Don't spend too long on one question.
- If you have time at the end, go back and check your answers.

For examiner's use			
Q	Mark	Q	Mark
1		12	
2		13	
3		14	
4		15	
5		16	
6		17	
7		18	
8		19	
9		20	
10		21	
11		22	
Total			

Answer ALL the questions.

Write your answers in the spaces provided.

You must show all of your working.

1 A fathom is an old unit of length, typically used to measure the depth of water.
1 fathom \approx 1.8 m.

(a) A submarine can dive to a depth of 388 fathoms.
Approximately how far is this in metres? Circle your answer.

215.6 m 698.4 m 1086.4 m 310.4 m

[1]

(b) Approximately how many fathoms are in 4 km? Circle your answer.

2222.2 fathoms 2.2 fathoms 7.2 fathoms 7200 fathoms

[1]

[Total 2 marks]

2 A café offers a meal deal, consisting of a sandwich, a packet of crisps and a drink.

7 different sandwiches, 4 different flavours of crisps
and 5 different drinks are available in the meal deal.

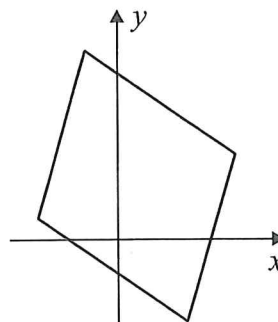
How many possible combinations of meal deal are there? Circle your answer.

140 60 63 16

[Total 1 mark]

3 How many invariant points will there be when
the shape on the right is reflected in the y -axis?
Circle your answer.

0 1 2 4

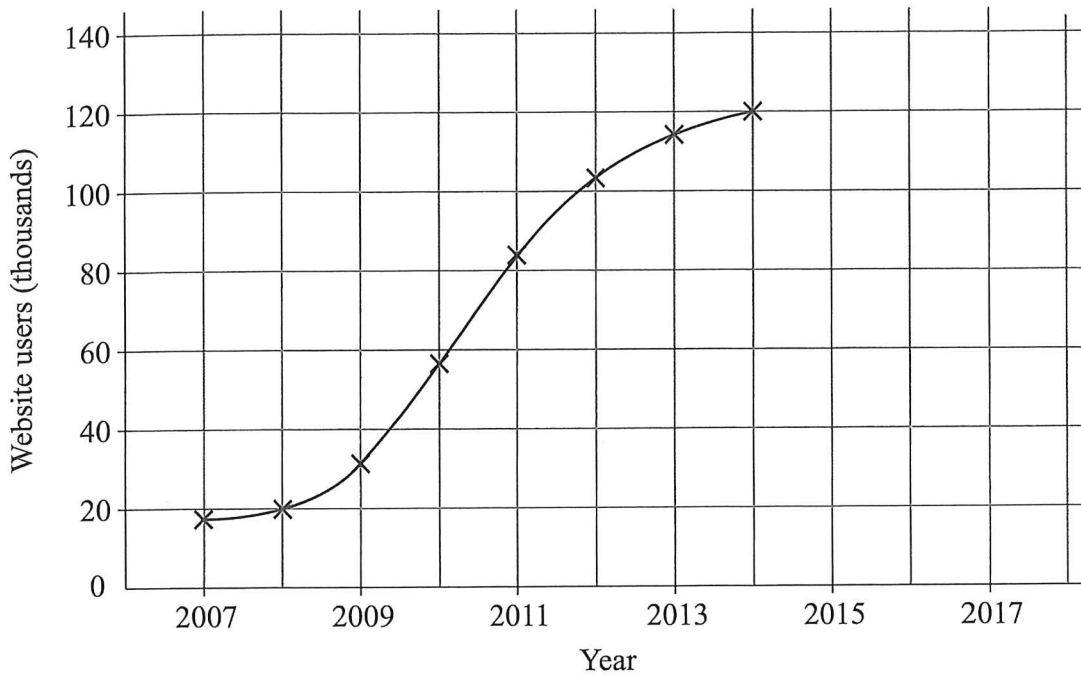


[Total 1 mark]

4

The time series graph shows the number of users of a social media website between 2007 and 2014.

Leave blank



(a) Describe the growth rate in the number of website users between 2007 and 2014.

.....
.....
.....
.....

[2]

(b) Use the graph to predict the number of users of the website in 2017.
Comment on the reliability of your answer.

.....
.....
.....
.....

[2]

[Total 4 marks]

Leave
blank

5 A box contains 123 chocolates, which are either plain, milk or white chocolate.

The ratio of plain to milk chocolates is 2 : 3

The ratio of milk to white chocolates is 7 : 2

Find the number of plain chocolates in the box.

.....
[Total 3 marks]

6 The first four terms of an arithmetic sequence are:

3 10 17 24

(a) Write an expression for the n^{th} term of this sequence.

.....
[2]

(b) Show that 1024 is not a term of this sequence.

[2]

[Total 4 marks]

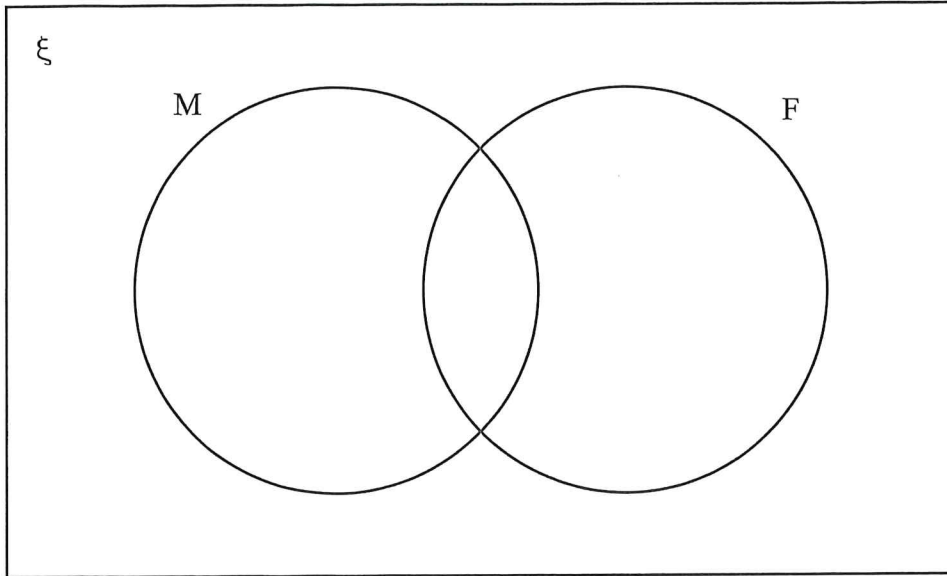
7 The sets ξ , M and F are shown below.

$$\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$$

$$M = \{\text{multiples of } 3\}$$

$$F = \{\text{factors of } 60\}$$

(a) Complete the Venn diagram.



[3]

One of the numbers is chosen at random.

(b) Show that the probabilities of the number being in set $(M \cap F)$ or set $(M \cup F)'$ are equal.

[2]

[Total 5 marks]

8 For all values of x

Leave
blank

$$f(x) = 3x - 5$$

$$g(x) = x^2 - 3$$

(a) Work out the value of $g(-2)$. Circle your answer.

-5

-1

1

-7

[1]

(b) Find $f^{-1}(x)$

$$f^{-1}(x) = \dots\dots\dots [2]$$

(c) Show that $gf(x) = 9x^2 - 30x + 22$

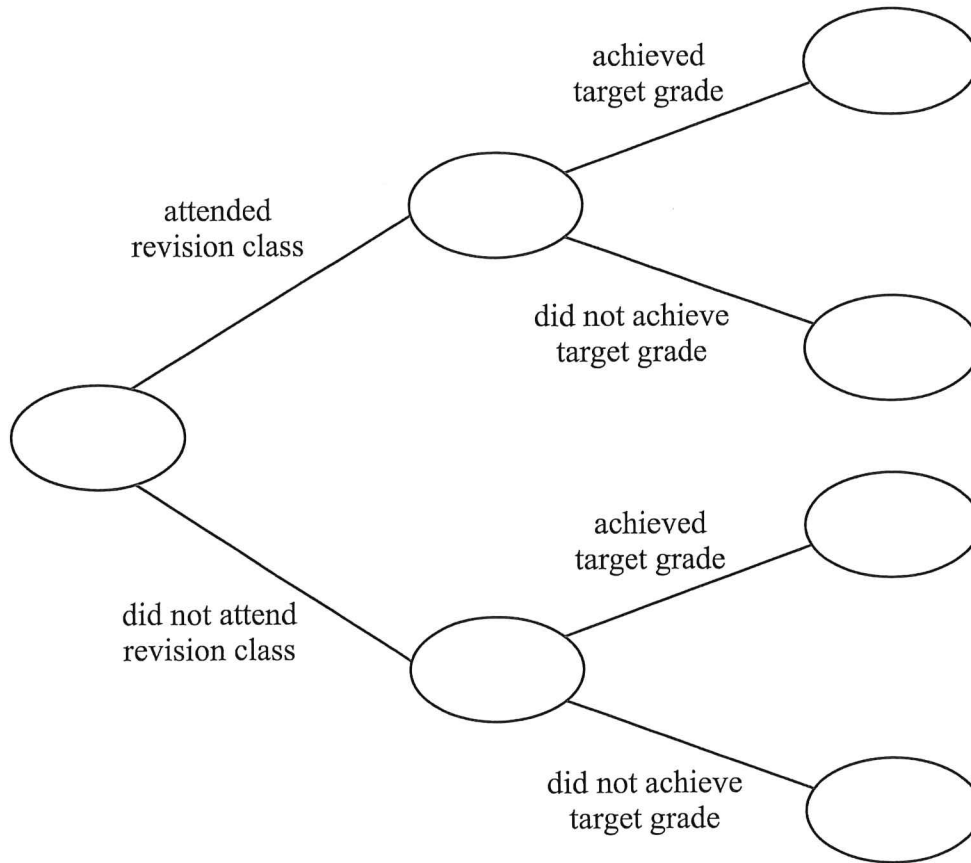
[2]

[Total 5 marks]

9 There are 30 students in a maths class. 60% of the students attended a revision class and 15 of the attendees achieved their target grade

Altogether, $\frac{2}{3}$ of the students achieved their target grade.

(a) Complete the frequency tree to show this information.



[3]

(b) What is the probability that a randomly chosen student achieved their target grade given that they did not attend a revision class?

.....
[1]

[Total 4 marks]

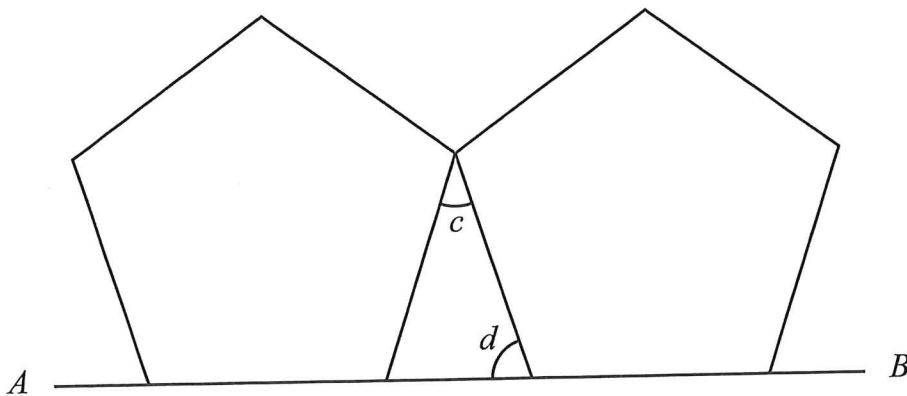
- 10 An insurance company analyses the impact of its TV adverts. They find that each week, the number of new customers (c) is directly proportional to the square of the number of TV adverts placed (a).

One week, 10 TV adverts were placed and the company got 1500 new customers.

Find how many TV adverts had been placed in a week when the company got 2940 new customers.

.....
[Total 3 marks]

- 11 The diagram shows two identical regular pentagons, each with a side on the line AB .



Show that the sizes of the angles c and d are in the ratio 1 : 2.

.....
[Total 3 marks]

Leave
blank

- 12 The formula for the period, T seconds, of a pendulum of length l metres is given by:

$$T = 2\pi\sqrt{\frac{l}{g}}$$

At the equator, $g = 9.78 \text{ m/s}^2$.

- (a) Find the period of a pendulum, of length 30 cm, at the Equator.
Give your answer to 3 significant figures.

$T = \dots\dots\dots$ seconds
[2]

At the North Pole, $g = 9.832 \text{ m/s}^2$.

- (b) The period of a 30 cm pendulum is measured at the Equator, then at the North Pole.
What is the percentage change in the period of the pendulum from the Equator to
the North Pole. Give your answer to 3 significant figures.

$\dots\dots\dots$ %
[3]

[Total 5 marks]

- 13 Eleven science students sat a chemistry exam.
The number of marks scored by the students are shown below.

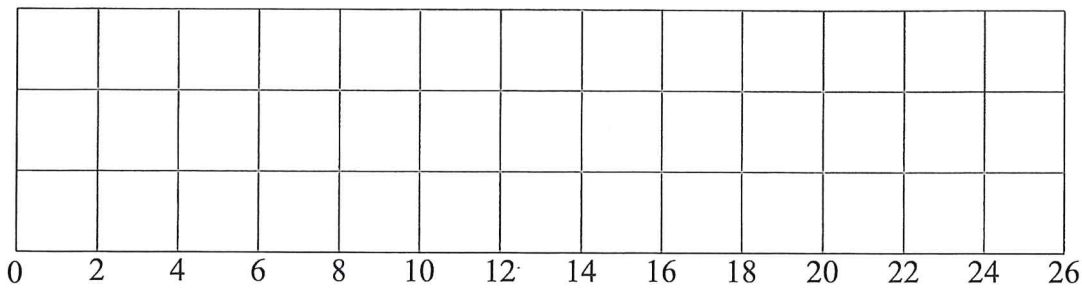
24 11 9 16 12 17 11 19 15 23 8

- (a) What is the median number of marks? Circle your answer.

17 15 12 15.5

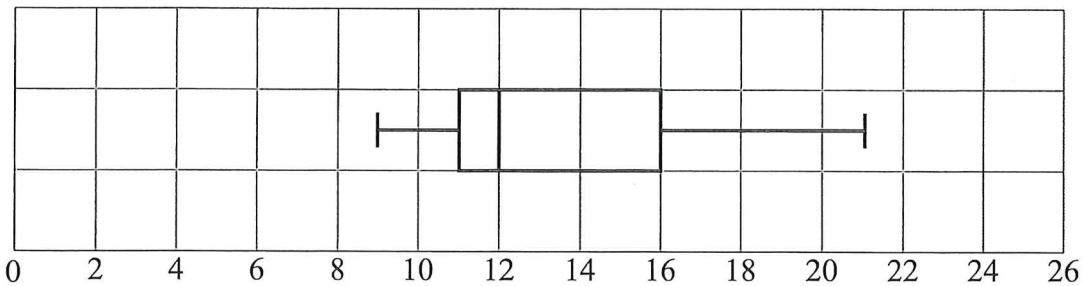
[1]

- (b) Draw a box plot to show the information above.



[2]

The same students also sat a physics exam.
The box plot below shows a summary of their scores.



- (c) Compare the marks the students scored in the chemistry and physics exams.

.....

[2]

[Total 5 marks]

- 14 Show that the straight line through the points (2, 7) and (5, 13) is perpendicular to the line $2y = 13 - x$

Leave
blank

[Total 3 marks]

- 15 Aaron invests £750 in a bank account that pays a fixed rate of compound interest each year. After 4 years, he has a total of £844.13 in the account.

What is the annual rate of interest?

..... %

[Total 3 marks]

- 16 The number of people living in a town increased by 7% between 2010 and 2015.
In 2015, the number of people in the town was 32 000 to the nearest 1000.
- (a) Estimate how many more people live in the town now compared to 5 years ago.

*Leave
blank*

.....
[2]

- (b) Mikko says “As 32 000 is rounded to the nearest 1000, the estimate to part (a) could be as much as 500 away from the actual answer.”

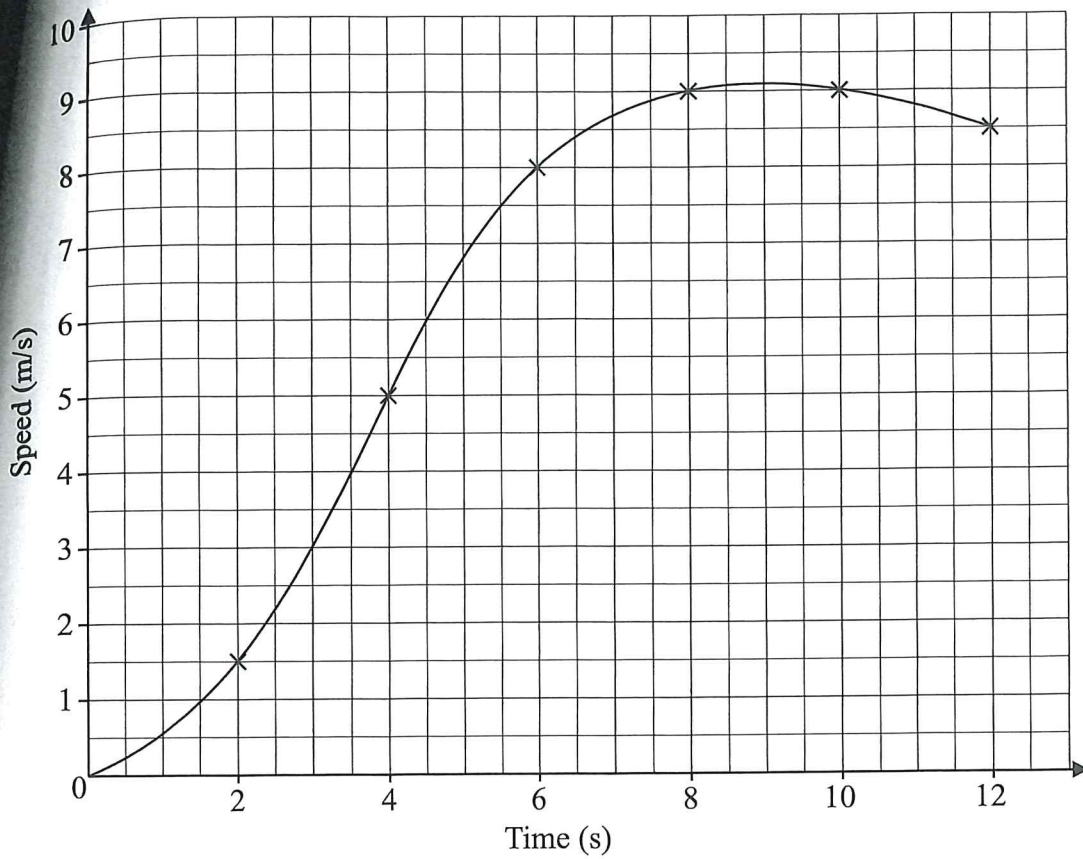
Is Mikko correct? Show calculations to support your answer.

.....
.....
.....
.....
.....
.....
.....
.....
[3]

[Total 5 marks]

Katie's speed was measured as she skated for 12 seconds.
 The graph shows the speed in metres per second, t seconds after she started skating.

Leave
 blank



- (a) Calculate an estimate for Katie's acceleration when $t = 6$.

..... m/s^2
 [2]

- (b) Draw 3 strips of equal width on the graph to work out an estimate for the total distance Katie skates in the first 12 seconds.

..... m
 [3]

[Total 5 marks]

18 Show that the lowest common multiple of 450^3 and 240^3 is 60^6 .

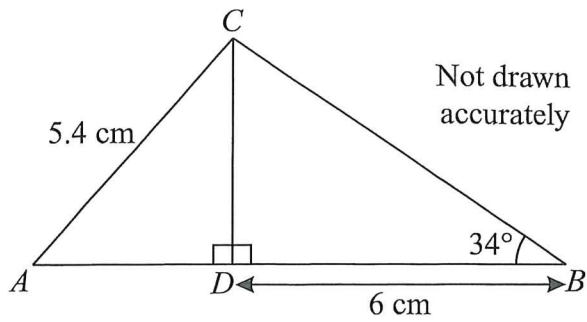
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blank*

[Total 4 marks]

19 Simplify $\frac{6x-3}{2x^2+7x-4} \div \frac{15}{x^2-16}$

.....
[Total 4 marks]

- 20 The diagram shows triangle ABC split into two right-angled triangles. Angle ABC is 34° . $DB = 6$ cm, $AC = 5.4$ cm



Leave blank

Find the area of triangle ABC . Give your answer to 2 decimal places.

..... cm²

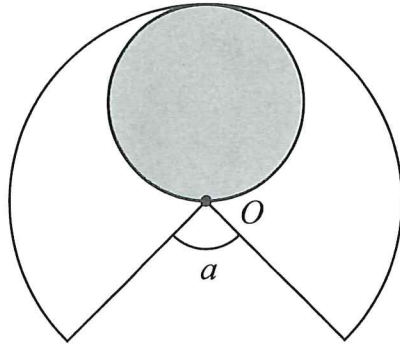
[Total 4 marks]

- 21 Prove that $(3n + 2)^2 - 1$ is a multiple of 3 for all positive integer values of n .

[Total 3 marks]

- 22 The diagram shows a shaded circle drawn inside a sector of a larger circle, with centre O .

Leave
blank



Not drawn
accurately

If 30% of the sector is covered by the shaded circle, find the angle a .

$a = \dots\dots\dots$

[Total 4 marks]

[TOTAL FOR PAPER = 80 MARKS]